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| APPLICATION NO.   | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|-------------|----------------------|---------------------|------------------|
| 10/568,614  | 08/23/2006  | Atsushi Koizumi      | 286272US0PCT        | 9363             |
| 22850   | 7590        | 01/10/2007           | EXAMINER            |                  |
| OBLON, SPIVAK, MCCLELLAND, MAIER & NEUSTADT, P.C.<br>1940 DUKE STREET<br>ALEXANDRIA, VA 22314 |             |                      | KATAKAM, SUDHAKAR   |                  |
|   |             | ART UNIT             | PAPER NUMBER        |                  |
|   |             | 1621                 |                     |                  |
| SHORTENED STATUTORY PERIOD OF RESPONSE  | MAIL DATE   | DELIVERY MODE        |                     |                  |
| 3 MONTHS  | 01/10/2007  | PAPER                |                     |                  |

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

|                              |                        |                     |  |
|------------------------------|------------------------|---------------------|--|
| <b>Office Action Summary</b> | <b>Application No.</b> | <b>Applicant(s)</b> |  |
|                              | 10/568,614             | KOIZUMI ET AL.      |  |
|                              | <b>Examiner</b>        | <b>Art Unit</b>     |  |
|                              | Sudhakar Katakam       | 1621                |  |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) Responsive to communication(s) filed on 16 February 2006.
- 2a) This action is FINAL.                    2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) Claim(s) 1-5 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) Claim(s) \_\_\_\_\_ is/are allowed.
- 6) Claim(s) 1-5 is/are rejected.
- 7) Claim(s) \_\_\_\_\_ is/are objected to.
- 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on \_\_\_\_\_ is/are: a) accepted or b) objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) All    b) Some \* c) None of:
  1. Certified copies of the priority documents have been received.
  2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____.                                     |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>2/16/2006</u> .   | 6) <input type="checkbox"/> Other: _____.                         |

## DETAILED ACTION

### ***Information Disclosure Statement***

1. The examiner has considered applicant's Information Disclosure Statement of 02/16/2006. Please refer to the signed copies of the PTO-1449 forms attached herewith.

### ***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

4. Claims 1-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Okumura et al** (US 4,270,011) in view of **Smith** (US 5,204,064).

Instant claims are drawn to a method for producing a tertiary butyl alcohol from isobutylene and water in the presence of cation-exchange resin catalyst and at least

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one solvent from the group consists of sulfones and organic carboxylic acids by using catalytic distillation apparatus.

**Okumura et al** teaches a method in which, isobutylene in a C<sub>4</sub> hydrocarbon mixture with n-butenes and butanes is selectively hydrated to tertiary butyl alcohol by carrying out the reaction with water at a temperature not above 100°C in the presence of an acidic cation exchange resin and a sulfone [see Abstract]. The amount of solvent concentration of 50 to 97% by weight, especially 60 to 95% by weight, and water/isobutylene molar ratio of from 1.0 to 10.0 preferably from 1.6 to 6.0, in a C4 hydrocarbon mixture containing isobutylene, n-butenes and butanes [col. 4, lines 16-22]. The starting C<sub>4</sub> hydrocarbon mixture containing isobutylene is reacted with the aqueous solution of the sulfone in a catalyst packed reaction vessel, and the resulting mixture of hydration reaction products is subjected to distillation [col. 4, lines 41-45]. The reaction rate and the conversion of isobutylene are remarkably increased, and tertiary butyl alcohol can be prepared in a high yield while occurrence of side reactions is inhibited [col. 4, lines 56-62].

**Okumura et al** also teaches that a strongly acidic cation exchange resin is preferably used as the porous, acid-type cation exchange resin and there may be used a sulfonated polystyrene-type resin formed by introducing sulfonic acid groups into a styrene-divinyl benzene copolymer base, a phenol-sulfonic acid type resin formed by introducing sulfonic acid groups into a phenol-formaldehyde condensate and a perfluorosulfonic acid type resin formed by introducing sulfonic acid groups into a vinyl ether fluoride-fluorocarbon copolymer.

The difference between the instant invention and **Okumura et al** is the nature of reactant or a starting material. In the instant invention the tertiary butyl alcohol is produced from isobutylene, whereas in **Okumura et al** the tertiary butyl alcohol is made from a C<sub>4</sub> hydrocarbon mixture containing isobutylene, n-butenes and butanes. Other difference is the use of "catalytic distillation apparatus" in the production of tertiary butyl alcohol by the instant application, whereas **Okumura et al** is also used catalyst and distillation in their process but silent on the word "apparatus".

However, **Smith** teaches a method and apparatus for conducting a catalytic distillation process for the production of tertiary butyl alcohol from hydration of isobutylene in presence of acid cation exchange resin [col. 4 and lines 27-34]. The reaction rate can be increased by improving the contact of the liquid with the catalyst, which is accomplished by increasing the liquid level in the reaction distillation zone [col. 2, lines 13-17].

In view of explicit teachings of **Okumura et al** and **Smith**, the examiner asserts that it would have been obvious to a person of ordinary skill in the art, at the time of invention was made, to have modified the reference teachings, such as by using isobutylene alone as a starting material with the combination of catalytic distillation apparatus in the production of tertiary butyl alcohol, with a reasonable expectation of success. Please also note isobutylene is selectively hydrated to tertiary butyl alcohol in **Okumura et al**.

Modifying such methodology is *prima facie* obvious because an ordinary artisan would be motivated to use known purified compounds or known apparatus to

make the product more efficient or explore economical advantages over the other, since it is within the scope to optimize the conditions through routine experimentation.

***Conclusion***

5. Claims 1-5 are rejected.
6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sudhakar Katakam whose telephone number is 571-272-9929. The examiner can normally be reached on M-F 8:30 AM - 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thurman Page can be reached on 571-272-0602. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

SK

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